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Children with Gastroesophageal Reflux Disease: A Guide to Therapeutic and Pharmacological Treatments

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**CHILDREN WITH GASTROESOPHAGEAL REFLUX DISEASE:
A GUIDE TO THERAPEUTIC AND PHARMACOLOGICAL TREATMENTS**

By

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Submitted to the Occupational Therapy Department

of the

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In partial fulfillment of the requirements

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This scholarly Project Paper, submitted by Rebecca McOmie in partial fulfillment of the requirement for the Degree of Master's of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

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PERMISSION

Title Children with Gastroesophageal Reflux Disease: A Guide to
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Rebecca McOmie, OTR/L

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July 9, 2011

Date

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	vi
ABSTRACT.....	vii
CHAPTER	
I. INTRODUCTION.....	1
Project Background.....	1
Model.....	3
Summary.....	4
II. REVIEW OF LITERATURE.....	6
Introduction.....	6
Definition of GERD.....	7
Causes of GERD.....	8
Prevalence of GERD.....	9
Diagnostic Tools.....	10
Medical Interventions.....	12
Surgical Interventions.....	15
Therapeutic Interventions.....	15
Alternative Interventions.....	19

	Role of Occupational Therapy in Interventions.....	20
	Chapter Summary.....	21
III.	METHODOLOGY.....	23
IV.	PRODUCT.....	25
V.	SUMMARY.....	38
REFERENCES.....		41

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ABSTRACT

Gastroesophageal reflux disease (GERD) is becoming a more common diagnosis with young children and babies (PAGER, 2010). GERD is often misdiagnosed and there is no single test available to determine its presence (Eisen, 2001). The term reflux can be confusing and used to mean different things to different people. Often reflux is linked to colic in babies or may be considered a “normal” part of being a baby. But when a sequelae of symptoms arise in an infant, gastroesophageal reflux becomes a serious issue that needs to be addressed through a variety of interventions and sources (Sondheimer, 2006).

In an extensive literature review, the cause of GERD, diagnostic tools, pharmacological interventions, and therapeutic interventions were explored. GERD is thought to be caused by decreased tone in the lower esophageal sphincter (LES) near the stomach which allows contents from the stomach to reflux up into the esophagus and likely out the mouth (Pulsifer-Anderson, 2007). Studies have shown a possible genetic link to families with history of reflux conditions (Orenstein, et al., 2002), but this gene has not been shown to be present in all people having this disease. A variety of diagnostic tools are being utilized to assist in determining a diagnosis of GERD like barium fluoroscopy, 24-hour pH probe, and endoscopy with biopsy to name the most common procedures. Pharmacology interventions are being widely, and possibly overly,

utilized to combat the secondary causes of GERD (Khoshoo, et al., 2007). Generic names of commonly used drugs include Zantac, Prevacid, Prilosec, and Nexium, but with each medicine comes benefits and side effects that must be weighed by the parents and doctors to determine their effectiveness and risk for the child (Hellemeier, 1996). Therapeutic interventions tend to be conservative in nature and include positioning, thickened feedings, and smaller feedings (Orenstein & McGowan, 2008).

The role of the occupational therapist in this setting is to assist the family and child in determining the best course of action and plan that will help their baby. Occupational therapists have special training with feeding (Clark, et al., 2007) as well as utilizing positioning devices and equipment to assist the families in dealing with GERD.

A pamphlet was created to give parents an overview of how to determine their child has GERD, the types of diagnostic tools used to diagnose GERD, pros and cons of the various pharmacological interventions, and how occupational therapists can assist in providing conservative care utilizing positioning and feeding techniques. The pamphlet was designed to be available at doctor offices, public health, early intervention centers, and specialty clinics in an effort to assist parents in navigating the process and dilemma of GERD.

CHAPTER I

INTRODUCTION

Project Background

In working with young children for over 15 years as an occupational therapist, I have encountered numerous children with various issues related to feeding and eating. The main issue I face when working with these children is the diagnosis of gastroesophageal reflux (GER). GER is the backwashing of stomach contents up into the esophagus and occasionally into the mouth (Pulsifer-Anderson, 2007). An even more serious condition for these children is gastroesophageal reflux disease (GERD). GERD is defined as reflux episodes that cause some sort of measurable problem or consequence such as pneumonia or failure to thrive (Sondheimer, 2006). Babies with GERD often have difficulty gaining weight, have poor growth or failure to thrive (FTT), develop secondary diagnoses like pneumonia or asthma, or exhibit esophagitis or esophageal ulcers (Pediatric/Adolescent Gastroesophageal Reflux Association, Inc. [PAGER], 2010). These babies are sometimes considered to be “fussy” babies or babies with “colic”. Our role as occupational therapists (OT) is to help the family determine what changes will help improve the infant’s feedings, along with positioning and other strategies to improve their quality of life. OTs are helpful to parents as a support system because of their understanding of medical terminology, medications, and procedures that their child may be involved in during the process of diagnosing and managing GERD.

In my practice as an occupational therapist, I have encountered an increased number of children and babies diagnosed with GERD. In order to address this issue, a pamphlet was created to give parents an overview of how to determine if their child has GERD, the types of diagnostic tools used to diagnose GERD, pros and cons of the various pharmacological interventions, and how occupational therapists can assist in providing conservative care utilizing positioning and feeding techniques. The pamphlet was designed to be available at doctor offices, public health, early intervention centers, and specialty clinics in an effort to assist parents in navigating the process and dilemma of GERD. Learning the causes of GERD, the diagnostic tools used to diagnosis GERD, and the various pharmacological and therapeutic interventions utilized with GERD can be very helpful for the family.

According to Gold (2005), the cause of GERD is unknown, but it has raised many questions and concerns that validate it being researched extensively. GERD may be very scary for some parents because they worry their baby is unable to get the nutrients needed to grow and learn. Some babies “spit up” with no fussing, and other babies cry, arch their backs, and turn their heads away when they reflux (Pulsifer-Anderson, 2007). All of these signs can be very disconcerting for parents who just want their baby to eat, and be happy and content. Parents often hope that their baby will “grow out” of this stage, and many babies will, but for those babies in which GERD persists, it is a long and tedious road to navigate (El-Serag, Gilger, Carter, Genta, & Rabeneck, 2004). Occupational many babies will, but for those babies in which GERD persists, it is a long and tedious road to navigate (El-Serag, Gilger, Carter, Genta, & Rabeneck, 2004). Occupational therapists can assist these families with support, nurturing, and practical interventions to

help the baby during this process. They have specialized knowledge in feeding, positioning, and medical terminology that they can use to help parents understand the disorder and to better help their baby (Clark, et al.,2007).

Model

The occupational based model utilized throughout the process of this scholarly project was Occupational Adaptation (OA) by Schultz and Schkade (Kramer, Hinojosa, & Royeen, 2003, pp. 181-221). According to the authors, assumptions under this model for occupational therapy include: occupation is universal (in this case, feeding); occupation (feeding) requires adaptation (changes to amount of feeding, thickened feeding, positions, use of medications); relative mastery (utilizing therapeutic and pharmacological interventions to meet the needs of the infant to decrease GERD); and occupational adaptation process (in which a series of actions and events that challenge the infant to change the interaction between themselves and their environment).

This model can be utilized to assist parents in the role of adapting their child's feedings and environment to modify the effects of GERD on the infant. The OA model helps the occupational therapist to aspire toward creating an environment that will assist the family and child with developing skills to adapt, thus enhancing their acquisition of relative mastery over meaningful occupations, despite their challenges. The OA interventions are driven by priorities of the family and in collaboration with them (Kramer, et al., 2003). For example, the family wants their baby to be able to gain weight, have less reflux episodes, and display a happy and content demeanor. The occupational therapist will utilize his/her knowledge of the OA model to incorporate

smaller feedings throughout the day for the child, which can assist in keeping more food in the stomach to be digested and utilized for energy to grow and learn. The OT may suggest keeping the baby in a semi-reclined position during and after feedings to prevent the baby from putting unnecessary pressure on the abdomen which may cause them to reflux. Another adaptation the OT could make would involve thickening the baby's feedings which has been shown to decrease the amount of reflux, but not necessarily the frequency of reflux (Chao & Vandenplas, 2007). This means more food stays in the stomach to be digested and used for growth and development. The baby may be more content due to the decreased agitation to the esophagus with less reflux, and therefore, in a happier state throughout the day. This in turn, puts the family at more ease and contentment, which will continue to cycle and loop throughout the occupational adaptation process.

As the process of adaptations evolves, the parent and baby will feel more empowered to continue to develop and modify the approaches to elicit the desired outcome due to the success they have accomplished. The parent may continue to need guidance from the OT if the adaptations are less successful or inconsistent in nature.

Summary

This scholarly project contains five chapters. Chapter I provides an overview of the issue of GERD and the intended outcome of the project. Chapter II is the review of literature and research which was utilized to support the basis of this project. In Chapter III, an overview of the methodology that was used to develop the final product (informational pamphlet) and the actual informational pamphlet is encompassed within

Chapter IV. Lastly, Chapter V summarizes the entire scholarly project, limitations of the project, and recommendations for additional research in this area.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Gastroesophageal reflux disease (GERD) is becoming a more common diagnosis with young children and babies (PAGER, 2010). GERD is often misdiagnosed and there is no single test available to determine its presence (Eisen, 2001). The term reflux can be confusing and used to mean different things to different people. Often, reflux is linked to colic in babies or may be considered a “normal” part of being a baby. But when a sequelae of symptoms arise in an infant, gastroesophageal reflux becomes a serious issue that needs to be addressed through a variety of interventions and sources (Sondheimer, 2006).

Parents/caregivers of babies diagnosed with GERD are often stressed, lacking in sleep, and coping with the emotional and physical strains of caretaking for the infant (Pulsifer-Anderson, 2009). They just want their babies to gain weight appropriately, feed contently, and be happy.

Occupational therapists have special training with feeding (Clark, et al., 2007) as well as utilizing positioning devices and equipment to assist the families in dealing with GERD. The role of the occupational therapist in this setting is to assist the family and child in determining the best course of action and plan that will help their baby.

A pamphlet was developed to give parents an overview of how to determine their child has GERD, the types of diagnostic tools used to diagnose GERD, pros and cons of the various pharmacological interventions, and how occupational therapists can assist in providing conservative care utilizing positioning and feeding techniques. In order for the pamphlet to have validity, it needed to have its foundation based in the current literature.

Definition of GERD

After reviewing the literature regarding gastroesophageal reflux disease (GERD), it was quite obvious that the terminology of gastroesophageal reflux (GER) and GERD is used synonymously, thus creating confusion in assigning and treating this diagnosis. GER is defined as the spontaneous return of gastric contents into the esophagus (Wolf & Glass, 1992). GERD is defined as reflux episodes that cause some sort of measurable problem or consequence (Pulsifer-Anderson, 2007). Jung (2001) discerned how to differentiate between GER and GERD. The author noted that GER is regurgitation with normal weight gain, no signs or symptoms of esophagitis, no significant respiratory symptoms, and no neurobehavioral symptoms whereas GERD is regurgitation with poor weight gain, persistent irritability and pain in infants, lower chest pain, dysphagia, and pyrosis in children, hematemesis and iron deficiency anemia, apnea and cyanosis in infants, wheezing, aspiration or recurrent pneumonia, chronic cough, stridor, and neck tilting (Sandifer's syndrome) in infants (p. 1853). According to Deal (2005), researchers have conducted studies to create age-specific questionnaires to assist in distinguishing GERD symptom frequency and severity in infants and young children. The findings indicated that the questionnaires were appropriate and relevant to the symptoms of GERD and clearly distinguished healthy children from those with true symptoms of GERD. The

data supported that additional information is needed from longitudinal studies throughout actual clinical trials to establish validity of the questionnaires.

Many attempts have been made to more clearly delineate the definition of GERD. Sherman, et al. (2009) designed a global, evidence-based consensus to define GERD. Their goal was to develop an international consensus regarding the definition and classification of GERD in pediatrics. Of twelve statements relating to a global definition of GERD, nine statements were graded at 100% agreement. Those nine statements include:

GERD in pediatric patients is present when reflux of gastric contents is the cause of troublesome symptoms and/or complications; symptoms of GERD vary by age; symptoms due to GER are troublesome, when they have an adverse effect on the well-being of the pediatric patient; regurgitation in pediatrics is defined as the passage of refluxed contents into the pharynx, mouth, or from the mouth; bilious vomiting should not be diagnosed as GERD; regurgitation is a characteristic symptom of reflux in infants, but is neither necessary nor sufficient for a diagnosis of GERD, because it is not sensitive or specific; symptoms of GERD, particularly in infants, may be indistinguishable from those of food allergies; and pediatric population-based studies of reflux symptoms are insufficient and are a priority for further research. (pp. 1282-1286)

Causes of GERD

Wolf and Glass (1992) stated that many factors result in reflux, including : (1) transient and inappropriate relaxation of the lower esophageal sphincter (LES), (2) transient increase in intra-abdominal pressure, and/or (3) spontaneous free reflux from abnormally decreased LES tone.

Orenstein, Shalaby, Barmada, and Whitcomb (2002) conducted a literature review to determine if there was evidence supporting a familial or genetic basis for GERD. Through their review, they found a specific locus has been identified on chromosome 13

(13q14). Two of the studies reviewed looked at either a cross-sectional study or the use of a prospective questionnaire by linking relatives with a history of reflux issues. The cross-sectional study revealed heartburn and esophageal disease were significantly increased in immediate family members. The questionnaire demonstrated the respondents showed significant increase in symptoms and medications used by relatives in the group with GERD symptoms and the group with Barrett's esophagus (disorder in which the lining of the esophagus is damaged by stomach acid). An additional study of twins utilized a questionnaire regarding regurgitation and heartburn; the study data indicated that reflux occurred at least one time a week in at least 14% of the monozygotic twins (Orenstein, et al., 2002).

Prevalence of GERD

It is estimated that approximately 3-5% of all children in the United States have acid reflux with symptoms ranging from mild to severe (Pediatric/Adolescent Gastroesophageal Reflux Association, Inc. [PAGER], 2010). It is difficult to concretely estimate how many children are affected by GERD due to the interchangeable terminology and similar symptoms and signs of other disorders used throughout the medical profession (Rudolf, et al., 2001).

Pulsifer-Anderson (2009) stated it was hard to get exact estimates because the definition of reflux has changed frequently. Over the years, each study has used a slightly different definition of reflux, and opinions about how many children have reflux have changed dramatically in the past few decades. She reported GERD is a common medical problem affecting about 5% of otherwise healthy children. It is extremely

common among children with special needs and affects more than half of the children with cerebral palsy, Down syndrome, premature birth, and several other common conditions.

Tyler (2005) reported statistics from the Department of Otolaryngology in 2000 that GER resolves in most children by age one year (55%) or eighteen months (81%), but some children present with GERD throughout their childhood and possibly throughout their lifespan.

Diagnostic Tools

One of the initial issues in treating children with GERD is obtaining the diagnosis itself. There remains no single test that can uniformly detect GERD (Eisen, 2001); a variety of diagnostic tools are utilized in determining GERD, and a thorough history and physical examination is essential in acquiring an accurate diagnosis. A physician may choose to perform an upper gastrointestinal (GI) series including a barium swallow. Esophageal pH monitoring over a 24-hour period may also be utilized. The physician may decide to perform an endoscopy (with or without biopsy) to assist in ruling out other conditions (like Barrett's esophagus or Crohn's disease). Empiric medical therapy (pharmacological interventions) may be started to help treat the symptoms of GERD (Eisen, 2001).

Physicians perform a variety of diagnostic tests to quantitate the presence of GERD (Hillemeier, 1996), but these test do not give any information as to the etiology of the disorder. The most common procedure is a barium swallow which is a medical imaging procedure used to examine upper gastrointestinal tract which includes the

esophagus and, to a lesser extent, the stomach. Hillemeier (1996) reported that a barium swallow is a sensitive way of detecting reflux, but has a low specificity rate because many infants who have little or no clinical symptoms of reflux experience some of the barium to be refluxed into the esophagus. The barium swallow is not helpful in terms of evaluating rates of gastric emptying which is a key limitation of this test (Hillemeier, 1996).

A pH probe is the use of thin, flexible probes that detect pH in the distal esophagus and can detect the amount of acid reflux in this area (Hillemeier, 1996). pH probes are restricted by their ability to detect only episodes that cause a change in esophageal pH. This test is unable to detect the volume of reflux material, but can detect the frequency of episodes of reflux, the time it takes for an episode to be cleared, and over a period of time, the frequency of episodes of and reflux in the distal esophagus (ie. 24-hour pH probe study).

Endoscopy and esophageal biopsy is another diagnostic method to identify GERD. Endoscopy allows direct visualization of the esophageal mucosa and a biopsy can determine the severity of reflux esophagitis (Hillemeier, 1996). Epithelial eosinophils found after biopsy are sufficient to establish the presence of GERD in infants, yet this presence does not mandate the necessity for more aggressive therapy (Hillemeier, 1996).

Manometrics measure the changing pressure profiles in the upper gastrointestinal tract and changes in the basal lower esophageal sphincter (LES) tone. This procedure is difficult to perform in an unsedated infant, and has proven to be of little clinical use.

Initially, reports suggested that infants had decreased LES pressure, but later studies suggest the LES pressure is within normal ranges or even have a slightly increased LES pressure (Hillemeier, 1996).

According to Hillemeier (1996), scintigraphy, the ingesting of a radionuclide-labeled formula, allows a scan that calculates how much of the formula is emptied from the stomach over a given amount of time. Advantages of this test are that it is non-invasive, low in radiation, and widely available. The value of the results in documenting and quantitating GERD is small, but does allow for detection rates of gastric emptying that may be helpful with diagnosing GERD.

Medical Interventions

Once a physician has completed a thorough history and physical examination, and any diagnostic procedures to determine that a child has GERD, a regimen of pharmacological therapy may be initiated. These drugs, however, are used to treat secondary symptoms resulting from GERD because a known etiology for GERD has not yet been determined. There are three main types of medications currently used for this condition: Histamine₂-receptor antagonists (H₂RA); prokinetic agents; and proton pump inhibitors (PPIs).

The use of antacids or H₂ RA reduce the amount of gastric acid produced in the stomach and may have an effect on peptic esophagitis (Hillemeier, 1996). Jung (2001) noted Cimetidine (Tagamet) is effective with mild to moderate GERD; its side effects include headaches, dizziness, diarrhea, and gynecomastia (abnormal development of large mammary glands in males resulting in breast enlargement). Rantidine (Zantac) is

another antacid utilized for GERD. Side effects of Rantidine include headaches and malaise, but it has fewer overall central nervous system (CNS) and anti-androgenic side effects than Cimetidine (Jung, 2001). Some common antacids include Tums, Maalox, Children's Mylanta, Roloids, Milk of Magnesia, and Gaviscon. Antacids are suitable only for short term use for mild reflux and only with medical supervision. Antacids work quickly, but provide relief only for a very short time (Pulsifer-Anderson, 2009).

Bethanechol, a muscarinic agonist, has been shown to increase LES pressure, but has not been shown if it has any effect in reducing GERD. It has many undesirable side effects including cramping and diarrhea (Hillemeier, 1996).

Prokinetic agents move food through the gastrointestinal tract more effectively and more quickly by making the muscles work better through tightening of the LES muscle (Pulsifer-Anderson, 2009). Metoclopramide (Reglan), along with a related agent, domperidone, mildly increases resting LES pressure and somewhat increases gastric emptying. Few studies have demonstrated its effectiveness in infants and it has a high range of side effects such as restlessness and drowsiness. The extrapyramidal reactions in the form of acute dystonia manifesting itself as neck pain, rigidity, trismus (inability to normally open the mouth), and oculogyric crisis (dystonic reaction to certain drugs and/or medical conditions that include rotation of the eyeballs) are more of a concern (Hillemeier, 1996). Because of the seriousness of the side effects, Metoclopramide is no longer utilized in the treatment of GERD. Cisapride (Propulsid) enhances the release of neurotransmitters which seems to stimulate smooth muscle contraction throughout the intestinal tract. Side effects are directly related to the gastrointestinal tract (Hillemeier, 1996). This medication is no longer marketed in the United States because of adverse

events associated with arrhythmias in patients who were taking other medications with potential interactions or were suffering from underlying conditions known to increase the risk of cardiac arrhythmias. It has only limited access for patients whom meet clearly defined criteria (Jung, 2001).

Proton pump inhibitors (PPIs) reduce the amount of acid produced and secreted by the stomach (Sagall, 2008). Omeprazole (Prilosec), Lansoprazole (Prevacid), and Esomeprazole magnesium (Nexium) are all proton pump inhibitors used with children diagnosed with GERD. Side effects of these drugs include headache, diarrhea, abdominal pain, nausea, gas, constipation, dry mouth, and sleepiness (Sagall, 2008). It is critical to accurately assess the child's GERD and determine the best and most efficient type of medication to address their special needs.

Tyler (2005) recommended considering the timing of administration of medicines as well as monitoring and adjusting the dosage frequently as the child grows. Medications often metabolize faster in young children and may require more frequent or larger doses for optimal effectiveness.

A study by Diaz, et al. (2007) found that the majority of physicians based their diagnosis of GERD on history and physical examination, guideline recommendations for diet and lifestyle changes, acid suppression, prokinetic therapy, and antireflux surgery if needed. They found that even though PPIs have been shown to be superior to H₂RA agents for healing of esophagitis and symptom relief, only 60% of respondents to the study considered that acid suppression for GERD was best achieved by PPIs. The study results indicated that numerous definitions were used for GER and GERD and therefore

influenced how uniformly physicians initiate and treat the condition. The data summary the physicians completed confirmed that despite the guidelines, many infants are inappropriately treated for GERD.

Surgical Interventions

Surgery is rarely used, but in severe to profound cases of GERD it is an option after diet, positioning, and medicines have been shown to be ineffective (Tyler, 2005). Lasser, Liao, and Burd (2006) recommended antireflux surgery as a treatment for option for children who experience failure of maximal medical management. Fundoplication surgery can tighten the juncture of the esophagus at the stomach. A band of upper stomach muscle is wrapped totally (Nissen) or partially (Thail) around the lower esophagus (Tyler, 2005). Following surgery, the child may lose their protective ability to vomit, burp or retch which can introduce additional risks. Surgery is considered critical in reducing severe esophageal damage and reducing the risk of aspiration. Hillemeier (1996) cautions that a large percentage of the procedures breakdown within a relatively short period of time and may need to be amended or tightened for an equal effect.

Therapeutic Interventions

Conservative treatment should be the initial response to a diagnosis of GERD (Hillemeier, 1996). It involves thickened feedings (one tablespoon of dry rice cereal per one ounce formula or breast milk), and positional changes as well as dietary modifications. Thickened feedings have been shown to decrease regurgitation and crying, but does not decrease acid reflux (Orenstein, 2008). It also assists in increasing daily caloric intake which is essential for growth. Smaller, more frequent feedings along

with avoiding foods and behaviors that decrease LES tone should also be considered. This has shown to decrease acid reflux for the total duration and length (Orenstein, 2008). Thickening formula is quite beneficial, but may induce coughing in some infants Pulsifer-Anderson (2009). The nipple hole size on the bottle may need to be adjusted to accommodate the thicker liquid.

For children diagnosed with GERD, complete upright position for up to 90 minutes after feeding and prone incline positioning for sleeping may be considered. Tyler (2005) suggests a semi-upright position during and immediately following feedings. The infant should not participate in vigorous activity after feedings and the baby should wear loose fitting clothing and diapers to decrease pressure on the abdomen. The prone incline sleeping position does not mesh with the Back to Sleep (National Institutes of Health [NIH], 2005) recommendations, and the benefits and risks must be carefully weighed for each individual child. Minimizing seated positioning after feedings as it provokes reflux by increasing intra-abdominal pressure is another positional option. Orenstein (2008) reported the prone position provides the greatest benefit for reducing acid reflux. Placing a 30 degree wedge in the baby's crib, using a Tucker sling, or Amby bed may be useful in supporting the prone position. Laying the infant on his/her left side has also shown to be beneficial for children with GERD and aids the digestive system in the process of emptying the stomach of its contents using gravity (Tyler, 2005). Prone positioning for sleeping is only considered in unusual cases where the risk of death from complications of GERD outweighs the potential increased risk of sudden infant death syndrome (SIDS; Rudolph, et al., 2001). Scientific studies have not demonstrated consistent efficacy for positioning a baby upright particularly after

meals (Pulsifer-Anderson, 2009). Parents and professionals can use careful observation to see whether positioning helps. Positioning devices are an option that may significantly help the family in getting a good night's sleep for both baby and parents. Seated and supine positions are still required for safety like car seats in automobiles and supine for sleeping; parents were encouraged to wait at least one hour after the feeding before participating in these activities due to the added abdominal pressure that can be created when in a seated or semi-reclined position which may induce increased reflux episodes (Orenstein & McGowan, 2008).

Findings in a study by Chao & Vandeplass (2007) supported thickened feedings along with antireflux postures to be the most effective in decreasing regurgitation and/or vomiting. The study findings indicated that thickened feedings were more effective than positioning on its own. The addition of cereal to thicken the feedings also facilitated an increased weight gain versus positional treatment alone.

Dietary changes may also be considered for the infant with GERD. Infants who are breastfed are able to digest breast milk more quickly than formula. Caution should be used when thickening expressed breast milk for bottle feeding as the enzymes in the breast milk work to break down the cereal keeping it thin. This practice may also disrupt the bonding during nursing and should be tried cautiously. Mothers of infants who are breastfeeding may be encouraged to begin an elimination diet if their baby is showing signs of fussiness, colic, or GERD symptoms; eliminating cow's milk and soy products from the mother's diet is a good place to start. Minimizing spicy foods, chocolate, caffeine, and acidic foods in the mother's diet may also need to be considered due to the mother passing these food elements to her baby through breast milk. Food triggers such

as alcohol, mint, chocolate, and caffeine may relax the lower esophageal sphincter (LES) and citrus, tomato, spices that add heat, vinegar, and sour condiments can increase production of acid. Some foods such as: rich sauces, fried foods, high fat meats, pastries with frostings, and cheese take longer to digest because they contain fat.

Babies that are formula fed may be allergic or intolerant of milk and soy proteins and could benefit from a casein hydrolysate formula such as Alimentum, Nutramigen, or Pregestimil or an amino-acid based formula such as NeoCate or EleCare Thickened feedings (Tyler, 2005). Minimizing air swallowing and gas by making sure the infant has an adequate latch on the breast or bottle nipple along with burping often and efficiently can be helpful. Bottles that help reduce air intake include Dr. Brown's and Avent brands. Non-nutritive sucking (ie. pacifier) should also be encouraged as it assists in increased saliva production which can ease irritation and speed gastric emptying (Tyler, 2005).

According to Pulsifer-Anderson (2009), smaller, more frequent feedings may also benefit the child (Pulsifer-Anderson, 2009). A baby stomach is very small, so it makes sense not to overfill it. For instance, instead of feeding your baby six 5 ounce bottles of formula (30 ounces/per day), feed him/her eight 4 ounce bottles throughout the day (32 ounces/per day). The baby will be better able to maintain this smaller amount of formula per feeding versus spitting up to half or most of the formula; the smaller feedings allow the baby to digest and get the nutrients and calories he/she needs to grow. If breastfeeding, offer only one breast per feeding.

Eliminating exposure to tobacco smoke due to risks of worsening GERD and detrimental effects to the overall general health of the baby is another factor to consider when an infant is diagnosed with GERD. Studies suggest increased smoke exposure to infants and young children predicted an increase in continued acid reflux and increased persistence of reflux symptoms from infancy to age 9 years (Rudolph, et al., 2001).

Alternative Interventions

Less widely known or utilized for the treatment of GERD are alternative therapies. These methods encompass a variety of treatments and remedies, many of which are very old and traditional, and have been practiced and studied in other countries. *Complementary* treatments are used along with standard medical care. *Alternative* treatments replace standard medical care, and *integrative* therapy is when a practitioner believes that different therapies can be used at the same time and not compete with each other (Pulsifer-Anderson, 2007).

Manipulative (bodywork) techniques may include: massage therapy; chiropractic services; cranial sacral therapy; and physical therapy. The practitioner moves the patient's body in specific way. Acupuncture and/or acupressure may also be utilized. A chiropractor would cite spinal misalignment during birth as a common cause of reflux. Cranial sacral therapy addresses misalignment of skull bones that can pinch nerves and spinal cord as they exit the base of the skull—they believe gently manipulation of the skull bones can relieve pressure on the nerves. Massage therapy is used to calm a fussy and irritable baby and decrease their digestive discomfort. Acupuncture is an ancient treatment from China using small, thin needles placed on key points on the body to treat

ailments. It has been proven effective for treating nausea. Acupressure uses fingers or blunt objects pressed to points on the body (reflexology). The use of pressure points in the hands and feet are used to stimulate other parts of the body and has a good reputation for nausea (Pulsifer-Anderson, 2007).

Alternative medicines raise concern regarding contaminated medications and/or herbs, especially from other countries outside the United States. Homeopathy is a system for treating illnesses by giving diluted substances that stimulate the body to recover. Naturopathics provide a variety of treatments including diet, vitamins, chiropractic techniques, acupuncture, massage, lifestyle counseling, and traditional Chinese medicines—the focus is on teaching the body to heal itself. Herbal supplements like *carminatives* (soothe stomach and decrease gas) and *demulcents* (offer protective barrier for irritated tissue) have an antispasmodic property used in digestion. Probiotics are beneficial bacteria found in the stomach. Some include acidophilus, lactobacillus, and bifid bacterium may reduce digestive issues like colic and diarrhea. Yogurt also contains live bacteria and some baby food manufacturers are starting to add pro/prebiotics which are like vitamins for good bacteria and encourage them to thrive. Digestive enzymes help breakdown food to ease absorption and digestion. None of these alternative therapies should be considered or initiated without consulting and informing the child's pediatrician (Pulsifer-Anderson, 2007).

Role of Occupational Therapy in Intervention

Occupational therapists (OT) have specialized knowledge and skills in the area of feeding (Clark, et al., 2007) which can be very beneficial and useful for families who

have a child diagnosed with GERD. OTs are also trained in positioning techniques and can assist families in choosing appropriate positioning equipment if needed. Pulsifer-Anderson (2009) described how early childhood professionals, including occupational therapists, can help families with children diagnosed with GERD in three important ways: first, to help families understand the disease thoroughly so parents can track the symptoms and work with their medical team; second, to help families learn homecare techniques that are an essential part of the treatment; and third, to support families when the daily demands of reflux pose a high emotional and physical burden. OTs can help parents identify the baby's cues; they can help the parents understand that the baby's stomach is demanding food, but her throat feels raw from reflux and she doesn't want to swallow. OTs can work to help the baby and his/her parents get through this time safely by being sensitive to the anger and drama that the stress of GERD can create. Praising parents for all of the patterns they see and coping skills they have developed will go a long way in the process of dealing with GERD. Tyler (2005) stated families of young children with disabilities report that managing GERD and related feeding problems is the hardest part of parenting a young child with a disability. Occupational therapists have specialized training in working with children with disabilities as well as experience for assisting the parents to deal with the psychosocial aspects and to develop coping strategies that can be utilized with the child with GERD.

Chapter Summary

Having a child diagnosed with GERD can be a daunting and frustrating process for the parents and the child. Learning the causes of GERD, the diagnostic tools used to diagnosis GERD, and the various pharmacological and therapeutic interventions utilized

with GERD can be very helpful for the family. Occupational therapists have special training to assist families and children with GERD. They can help the family understand medical procedures and terminology, support the family in their daily routines, assist with positioning and equipment needs, and help them devise coping mechanisms and stress management skills in order to deal with GERD.

In order to address GERD, a pamphlet was developed to assist parents in navigating through the too often medical-jargoned terminology and to break down the causes of GERD, tests and treatment strategies for GERD, and resources for further gathering information regarding GERD. According to Pulsifer-Anderson (2007), parents benefit from being an integral part of the medical team; the parents know their baby the best and are the “front line” caregivers 24/7. The parents who are empowered to observe their babies’ cues and adjust their care based on those observations report being more satisfied with this routine in their babies’ life. Parents who have additional support systems, family and friends, as well as networking with other parents in similar situations, are better able to utilize coping mechanisms to help them and their baby through this process of dealing with and adjusting to the cycle of GERD. The pamphlet will be available in a variety of settings including doctor’s offices and can begin to assist parents to understand GERD. The methodology for creating the pamphlet is included in Chapter III; the pamphlet in its entirety is in Chapter IV; and Chapter V includes the summary and recommendations for this scholarly project.

CHAPTER III

METHODOLOGY

Gastroesophageal reflux disease (GERD) has been an ongoing issue in many of the children seen for early intervention services, especially those with special needs. Parents often feel frustrated and hopeless when they can't calm their baby and their baby won't eat or spits it all back up. GERD is often misdiagnosed and there is no single test available to determine its presence (Eisen, 2001). The term reflux can be confusing and used to mean different things to different people. But when a sequelae of symptoms arise in an infant, gastroesophageal reflux becomes a serious issue that needs to be addressed through a variety of interventions and sources (Sondheimer, 2006).

The issues above were addressed through the product of this scholarly project, a pamphlet that describes how GERD is diagnosed, the diagnostic tools used to determine GERD, the pros and cons of medications available for GERD, therapeutic interventions, and resources for the family. It is anticipated that this type of pamphlet will help empower the family in dealing with GERD.

The pamphlet was designed to be parent-friendly, using simple terminology that a range of learners could easily understand, and it was broken down into subareas so that the pamphlet could be utilized in its entirety or for just a particular subject. Information in the pamphlet was based on current literature and research. Taking into consideration

the adult-learning model, the standard reading level as determined by Flesch, who created the readability formula, can be at the eighth-grade to ninth-grade level (Dreeben, 2010); this was taken into consideration when developing the pamphlet. Although most adult learners process information more efficiently if it is presented using a multi-sensory approach: visual, auditory, vestibular, kinesthetic, this project was limited to a visual-only approach. To enhance the visual-only approach, color coding the different sections was utilized to help draw the reader's eye to the desired context within the pamphlet. Some other factors that were taken into consideration when compiling the pamphlet included: using shorter words and sentences; defining words that the reader may not understand, and using second person ("You") instead of first or third person (Dreeben, 2010, pp. 108-118). The pamphlet can be translated into different languages as needed to accommodate the family.

The Occupational Adaptation (OA) model guided the creation of the pamphlet by helping the occupational therapist to assist in creating an environment to help the family and child develop skills to adapt, thus enhancing the acquisition of relative mastery over meaningful occupations, feeding, despite the challenges, ie. GERD. The OA interventions are driven by priorities of the family and in collaboration with them (Kramer, et al., 2003). As the process of adaptation evolves, the family will feel more empowered to continue to develop and modify the approaches to elicit the desired outcome due to the success they have accomplished.

CHAPTER IV

PRODUCT

The product of this scholarly project was the creation of an informative pamphlet for parents/caregivers of children with suspected or diagnosed GERD. The pamphlet includes information on distinguishing between GERD and similar diagnoses, diagnostic procedures, pharmacological interventions, therapeutic interventions, and resources available to these families.

The pamphlet was created to be parent-friendly, easy to read and understand, and to be a basic introduction to the issues so as not to over-inundate caregivers with too much information, but to help guide them through the process. The pamphlet also includes further resources the family can utilize to assist them in understanding the GERD diagnosis and treatments.

The actual pamphlet is designed as a booklet to be printed in color on legal size paper which is then folded in half and stapled. For the purposes of this scholarly project, the format will be presented on single pages.

The pamphlet can be used as a reference for occupational therapists and other early intervention service providers to assist parents/caregivers in navigating and developing a plan to deal with the diagnosis of GERD.

A Parent's Guide to Gastroesophageal Reflux Disease (GERD)

How do I know if my child has GERD?

What causes GERD?

What procedures will be used to determine if
my child has GERD?

What types of interventions are available for
my child?

- Conservative therapy
 - Medications
 - Surgery

What resources are available for me and
my child?

How do I know if my child has GERD?

This can be challenging. The term “reflux” is often used to refer to “spitting up”, regurgitating (throwing up), and “fussy” or “colicky” baby. To an extent, each may be true in its own situation.

What is gastroesophageal reflux (GER)?

It is the backwashing of stomach contents into the esophagus. This is a normal process that happens to almost everybody after meals (Pulsifer-Anderson, 2009).

When does GER become an illness or condition?

When an infant or child who experiences an excessive number of reflux episodes after feedings. The child may fuss or cry a lot during feeding, but the doctor would not deem it necessary for medication, but may consider a “conservative” approach (to be discussed later).

When does GER becomes a disease?

These are reflux episodes that cause some sort of measurable problem or consequence such as pneumonia or failure to thrive (Sondheimer, 2006).

With GER, the baby will have regurgitation with normal weight gain, no signs of inflammation of the esophagus, no significant respiratory symptoms, and no neurobehavioral symptoms (Jung, 2001, p. 1853).

With GERD, the baby will have regurgitation with poor weight gain, persistent irritability, lower chest pain, apnea (stop breathing for short periods of time), wheezing, recurrent pneumonia, chronic cough, stridor, and neck tilting (Sandifer’s syndrome) (Jung, 2001, p. 1853).

What causes GERD?

Unfortunately, no one has been able to say exactly what causes GER or GERD, but many experts believe several factors contribute.

Wolf and Glass (1992) state that many factors result in reflux, including:

- Temporary and inappropriate relaxation of the muscle between the stomach and esophagus (lower esophageal sphincter—LES)
- Temporary increase in pressure within the stomach
- LES isn't strong enough and allows fluid to flow back up the throat

The (LES) is a ring of muscles at the bottom of the esophagus. The LES is supposed to stay contracted or tight, except when your baby swallows or burps. If it opens, the food can backwash up into the esophagus. There are many reasons this can happen such as:

- eating large meals; a baby's stomach is not as stretchy as an adult
- pressure on the stomach because your baby is not able to sit up well yet
- laying your baby on his/her back for long periods of time
- liquid diets
- shorter distance from the esophagus to the mouth (Pulsifer-Anderson, 2007)

There is no clear answer on why some babies develop GERD and others don't, but there has been research to suggest some forms of GERD can be inherited.

Other factors which may contribute to GERD:

- hiatal hernia (part of stomach comes up through the diaphragm)
- delayed stomach emptying
- premature birth
- allergies and/or intolerances
- constipation
- muscle tone issues

What procedures will be used to determine if my child has GERD?

First and foremost, your doctor will complete a thorough history and examination. The doctor should take into account your input as parents/caregivers as you are the ones who know your baby the best. There is no one single procedure that can diagnosis GERD (Eisen, 2001), but if your doctor wants additional testing to confirm the diagnosis, according to Hellemeier (1996), these are some of the options:

1. Upper gastrointestinal (GI) series including a barium swallow

It is the most common procedure which is medical imaging to examine the upper GI tract which includes the esophagus and stomach. It can detect reflux, but is limited in its ability to evaluate rates of gastric emptying.

2. pH probe

It uses a thin, flexible probe that detects pH in the esophagus and detects the amount of acid reflux in that area. It is useful to determine frequency of the reflux (24-hour study), but it is unable to detect the volume of the reflux material.

3. Endoscopy and esophageal biopsy

It is a small camera placed down the esophagus to view any obstructions or irritations to the lining of the esophagus. The biopsy can determine the cause of the irritation. It is a slightly more invasive procedure for the infant.

4. Manometrics

It measures the changing pressure in the upper GI tract and changes in the LES tone. It is not a preferred procedure to perform on an infant and has proven to be of little clinical use.

5. Scintigraphy

The infant ingests radionuclide-labeled formula and calculates how much of the formula is emptied from the stomach over time. It is a non-invasive and widely available test, but gives little information in documenting and quantitating GERD.

What types of interventions are available for my child?

There are typically three different approaches to the treatment of GERD including: conservative, medications; and surgery.

Conservative Therapy

Conservative therapy should be the initial response to a diagnosis of GERD. It involves thickened feedings, positional changes, and dietary modifications (Hillemeier, 1996).

1. **Thickened feedings** consist of adding one tablespoon of dry rice cereal per one ounce formula or breast milk. Smaller, more frequent feedings can also be considered. The nipple hole size on the bottle may need to be adjusted to accommodate the thicker liquid. Thickened feedings have shown to decrease regurgitation and crying, but does not decrease acid reflux. It also assists in increasing daily caloric intake which is essential for growth (Orenstein, 2008).
2. **Positional changes** includes complete or semi-upright position for up to 90 minutes after feeding, no vigorous activity after feedings, and loose fitted clothing and diapers to decrease pressure on the baby's tummy. A prone (tummy) incline position may be considered for sleep, but must be closely monitored to prevent sudden infant death syndrome (SIDS). Placing a 30 degree wedge in the baby's crib, using a Tucker sling, or Amby bed can support the tummy position for safe sleeping (Orenstein, 2008).
3. **Dietary changes** may also be considered for the infant with GERD. Changing a baby's formula may greatly affect their reflux. Some formulas you may try include: Alimentum; Nutramigen; Pregestimil; NeoCate; or ElaCare Thickened. If your baby is breast fed, the mother will want to consider her diet and eliminate/minimize spicy foods, chocolate, caffeine, and acidic foods as well as foods that take longer to digest like rich sauces, fried foods, high fat meats, pastries with frostings, and cheese. If attempting to thicken breast milk, you need to take into consideration that enzymes in breast milk break down the cereal faster keeping it a thinner consistency; it may also interfere with the bonding process and should be attempted with caution.

Please also consider eliminating your baby's exposure to tobacco smoke as it has been shown not only to be detrimental to your baby's overall health, but increased incidence of continued GERD symptoms (Rudolf, et al., 2001).

Medications—3 main types (Hillemeier, 1996 & Pulsifer-Anderson, 2007)

1. Histamine₂-receptor antagonists (H₂RA), antacids, reduce the amount of gastric acid produced in the stomach. They are usually given “as needed” or daily for long-term relief several times a day. They are most effective when taken on an empty stomach, but can be taken with food. **Side effects** may include headaches, dizziness, nausea, constipation, diarrhea, or stomach pain.
2. Prokinetic agents move food through the gastrointestinal tract more effectively and quickly by making the muscles work better through tightening of the LES muscle. They are only effective for some children. Doctors only use this medication with caution. **Side effects** frequently include abdominal cramps and diarrhea. Serious other side effects are specific to the particular medicine and you should check with your doctor and pharmacist before allowing your baby to take these medications.
3. Proton pump inhibitors (PPIs) reduce the amount of acid produced and secreted by the stomach. Most PPIs are released slowly into the baby’s system offering long-term relief. They are usually given once a day and are most effective if given 30 minutes before a meal. **Side effects** may include headaches, diarrhea, nausea, constipation, and gas.

List of common medications prescribed for GERD (Pulsifer-Anderson, 2007)

Brand Names for H ₂ RA	Generic Names for H ₂ RA
Axid	Nizatidine
Pepcid, Mylanta AR	Famotidine
Tagamet	Cimetidine
Zantac	Ranitidine
Brand Names for Prokinetics	Generic Names for Prokinetics
Propulsid	Cisapride—not available in USA
Bethanechol	Urecholine
Regan	Metoclopramide
Motilium	Domperidone—not in USA
Milk of Magnesia	Magnesium
Many brands	Erythromycin
Baclofen	Lioresal
Brand Names for PPIs	Generic Names for PPIs
AcipHex	Rebeprazole
Nexium	Esomeprazole
Prevacid	Lansorprazole
Prilosec	Omeprazole
Protonix	Pantoprazole
Zegerid	Ompرازole—immediate release

Surgery

Surgery is rarely used, but in severe to profound cases of GERD, it is an option after diet, positioning, and medicines have been shown to be ineffective (Tyler, 2005).

Fundoplication surgery tightens the juncture of the esophagus at the stomach. A band of stomach muscle is wrapped totally (Nissen) or partially (Thail) around the lower esophagus (Tyler, 2005). After surgery, a baby may lose their protective ability to vomit, burp, or retch which can introduce additional risks. A larger percentage of the procedures breakdown within a relatively short period of time and may need to be amended or tightened for an equal effect (Hillemeier, 1996).

What resources are available for me and my child?

Occupational therapists (OTs) and other early intervention service providers can be a great resource for you and your baby. OTs have specialized training in feeding and positioning as well as adapting the environment to best suit the needs of the family (Clark, et al., 2007). Ask your doctor for information in your area or contact your local early intervention center to more assistance.

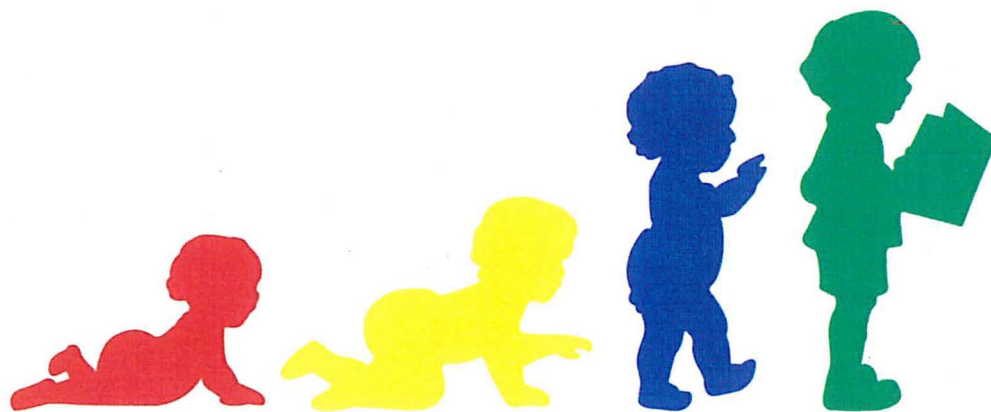
1. The Reflux Book: A Parent's Guide to Gastroesophageal Reflux by Beth Pulsifer-Anderson
2. Pediatric/Adolescent Gastroesophageal Reflux Association (PAGER) www.reflux.org
3. Amby Baby Motion Bed www.ambybaby.com
4. Tucker Sling www.tuckerdesigns.com

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CHAPTER V

SUMMARY

The pamphlet designed as a result of this scholarly project was organized in a systematic and sequential manner for parents of children diagnosed or being diagnosed with GERD to help them gain insight into this process of diagnosis and treatment of this disease. The pamphlet includes information on how to distinguish between GER and GERD, the diagnostic tools used, pharmacological interventions, as well as therapeutic interventions, ending with resources for the family to reference.

This scholarly project is limited in its nature by the fact that it has yet to be used in a variety of settings, and therefore, no feedback has been provided regarding its effectiveness in helping families deal with a diagnosis of GERD from professionals (doctors, therapists, and other early intervention providers) or the families themselves. Feedback from the doctors and other professionals could be utilized to improve and modify the pamphlet to best suit the needs of the families and children they are working with in their clinics and facilities. Input from families could also enhance and mold future pamphlets to meet their needs.

A pilot study using the pamphlet through the local child development center would be the starting point to distribute the information. After receiving feedback from occupational therapists and other early interventionists, changes to the pamphlet would be

completed, and then presented to the Wyoming Department of Developmental Disabilities for recommended revisions and distribution for state-wide use with other early intervention programs.

In order to market this pamphlet, initially, local pediatricians that make referrals to occupational therapy and early intervention for these children diagnosed with GERD would be asked to review the pamphlet and if they feel it is appropriate, give the pamphlet to families/caregivers of infants who have been or are diagnosed with GERD. A short in-service to public and community health centers would be set-up to inform the staff of the content of the pamphlet and its potential benefits for the families and children on their caseloads and future patients. Initial copying and distribution of the pamphlet would be provided by the local early intervention centers and each participating doctor or facility would receive 10 color copies. After receiving the initial copies, the facility would be responsible for copy costs incurred to replenish the pamphlet. If the pamphlet were to become successful, the hope is that the medical professionals as well as the families would share the pamphlet with other professionals and families throughout the state.

If this pamphlet were to be placed in local doctor offices, public health, and specialty clinics, it would need to be approved by the professional staff as being beneficial and useful to their clientele. The availability of updating information as it became available would also be a factor in utilizing the pamphlet in various settings. The staff would be asked to tally how many pamphlets were given out on a quarterly basis, to ask parents follow-up questions about the pamphlet's usefulness at the child's next

appointment and to record the responses on a feedback form. Data would be collected by phone or direct contact on a quarterly basis.

Based on the research literature reviewed in Chapter II, there is a significant need for continued research in this area. A clear, universal definition needs to be created and utilized by medical professionals. Further research into the area of a genetic predisposition, environmental factors, and creating a standardized-type tool to diagnose GERD is still needed as well as evidence-based research to determining the best intervention practices.

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